DOCUMENT RESUME

ED 220 354 SO 014 134

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TITLE Market Aspects of Diffusion: A Spatial Perspective on the Diffusion of Innovations in Thailand.
PUB DATE 81
NOTE 36p.; For a related document, see ED 200 486.

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Adoption (Ideas); *Agriculture; *Developing Nations; *Diffusion (Communication); Extension Agents; *Farmers; Information Dissemination; Information Sources; *Innovation; Linking Agents; *Marketing; Social Science Research
IDENTIFIERS *Thailand

ABSTRACT

How market factors affected the diffusion of four agricultural inputs (fertilizer, herbicide, insecticide, and fungicide) among farmers on the Central Plain of Thailand is examined. Market factors investigated were the distribution policies of the propagators and the travel behavior of the potential adopters. Data were gathered through personal interviews with farmers, agents of the Ministry of Agriculture, extension agents, companies, and merchants. The analysis of the spatial diffusion of the four agricultural inputs revealed that the two market factors not only played a major role in shaping their diffusion but the patterns that evolved differed from previous research based on the information flow perspective. Not all prospective adopters had the same opportunity to adopt. For example, information concerning innovations which emanated from the Ministry of Agriculture enabled provinces and counties, which they perceived to be in greater need, to receive the information first. At the local level, the promotional activities of the extension agents excluded private entrepreneurs in the urban centers and were limited to those villages where the agent perceived there to be the greatest potential for success. Many farmers willingly traveled as much as 50 kilometers to acquire information. Inputs, therefore, often diffused to the village level before they were available in the lowest order urban centers. Access of farmers to information through informing was rare. Farmers gained information about inputs primarily through seeking from fellow farmers and sources in urban centers. (RM)

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MARKET ASPECTS OF DIFFUSION:

A SPATIAL PERSPECTIVE ON THE DIFFUSION OF INNOVATIONS IN THAILAND

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1981

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ABSTRACT

Recently considerable interest has been shown in the "market" side of diffusion; those aspects of the diffusion process that control the availability of inputs to potential adopters. An examination of the diffusion of four agricultural inputs to farmers in Thailand focusing on communication relationships instead of the time order of adoption revealed that two "market" factors played a major role in shaping their spatial diffusion.

The purpose of this study is to examine and provide an empirical example of the processes that lead to the adoption of innovations over time. The paper focuses on the "market" side of diffusion, aspects of the diffusion process that may control the availability of information about innovations to potential adopters, and hence, play a major role in shaping diffusion patterns (2 ; 4 ; 5).

CONTEXTUAL DIFFUSION

Previous research on the diffusion of innovations has stressed the individual or household adoption decision and has explained the spatial diffusion of innovations from an information flow perspective. Hagerstrand, for example, posits a hierarchy of networks of interpersonal contacts through which an innovation diffuses from a limited number of individuals to the rest of the population (9). Brown points out that when diffusion is viewed from this perspective (4 ; p. 185):

> Diffusion in a single locality depends upon a local network of social communications; diffusion viewed at a larger scale depends upon a network coordinated with, say, the central place hierarchy.

More recent research suggests that the information flow perspective alone does not provide adequate explanation of the spatial diffusion of innovations, when, as occurs in most situations there are propagators intent upon diffusing them rapidly to as many

individuals as possible (2 ; 3 ; 4 ; 5 ;20). Brown and Cox suggest that a more complete understanding can be attained when the "market" side of diffusion is considered (5 ; pp. 557-558). Two "market" factors whose considerations are relevant to the availability of information and innovations at different locations, and thus the time at which they can be adopted, include the distribution policies of the propagators and the travel or shopping trip behavior of potential adopters (5 ; p. 555). Previous research has given little attention to these factors since it is implicitly assumed that all potential adopters have an equal opportunity to adopt.

Recent research has begun to alter much of the earlier thinking about the context of diffusion. Studies focusing on the spatial pattern of diffusion,from an information flow perspective, have traditionally argued that potential adopters would have more or less the same opportunity to adopt given access to an urban center that was part of a central place hierarchy comprised of higher and lower order urban centers. The reasoning for this was that in a landscape consisting of both higher and lower order urban centers it appears that most commercial and manufactured goods flow down the hierarchy (10; 11; 15; 20). However, when innovations are being diffused by propagators, the degree to which the hierarchy effect functions, especially in an area dominated by lower order urban centers is unclear (5 ; p.554). Brown and Cox argue that it is doubtful that each level in the central place hierarchy is

viewed favorably by the propagators because they are not equally profitable ([5] ; pp. 557-558). What is more likely to occur is that the various locations will be ranked and a promotional strategy will be developed, with the most profitable locations being exploited first and less profitable ones being exploited later or even excluded. A promotional strategy such as this, which is based on the profit potential of various locations, would certainly affect the spatial pattern of diffusion of innovations in the central place hierarchy and a potential adopter's access to these informal (interpersonal) sources given the assumed importance of the distance decay properties of the neighborhood effect to interpersonal contacts during the dual aspects of adoption: the decision-making process and acquisition.

Recent research testing the two-step flow theory of communication and the assumed role of the opinion leader in society also suggest that the diffusion of information and inputs into a social system, such as a village, from outside raises questions about the likelihood of everyone having the same opportunity to adopt. As originally conceptualized it was asserted that messages (information) flowed from impersonal sources (mass media) to opinion leaders, who in turn shared this knowledge with nonleaders, who were members of their social group. These formulations thus linked the formal channels of communication - the mass media - with informal sources - interpersonal - placing the opinion leader between the media and the rest of the population. In so doing, all potential adopters would have

an equal opportunity to adopt.

Formal mass media sources, however, have been found to be of limited value in linking farmers in many developing countries with information available outside their village social system. These formal channels have been found to be not widely available or accessible to most rural people and usually even when they are the content of the messages is rarely designed for a rural audience (1 ; 6).

The channels which most often link villages in developing countries with information emanating from outside have been found to be informal in nature (1 ; 18). Current evidence suggests that seeking from such informal sources may be far more common than previously thought and in part this appears to be related to the fact that information moves more readily across social status boundaries than previously thought (1 ;14 ; 19; 21). Shankariah found, for example, that Indian farmers readily sought information from sources located in urban centers beyond the confines of their village (18 ; pp.97-104). This pattern of information seeking with such informal sources appears to develop naturally as potential adopters gain access to new information sources that become available over time. Equal access to such sources would depend however upon the way in which the farmers' travel behavior interfaces with the distribution policies of the propagators in the central place hierarchy.

While little intensive research has been conducted focusing on

the places and people with whom potential adopters' have contact during the dual aspects of adoption, a variety of evidence suggests that their ability to overcome the friction of distance varies considerably. Factors such as a person's age, occupation, and socioeconomic status are among just some of the variables that appear to affect the size and shape of an individual's communication field (12; pp. 138-142). More dramatic differences in potential adopters' use of space may also exist between cultures (12; pp. 138-142).

Communication researchers also posit that variations in the frequency with which potential adopters' have contact with places and people located within their communication fields will influence which individuals will be contacted (8 ; 18). The reasoning for this stems from research which indicates that for effective communication relationships to develop between a source and a potential adopter, there must be sustained contact over time (8 ; p.1361). Following a similar line of reasoning, Kolars and Nystuen suggest that such a threshold may only be attained in the "average or usual area across which a person moves each day" (12; p.140).

The actual role that the opinion leader plays in the diffusion of information within a social system appears to further reduce the chances that individuals will all have the same opportunity to adopt as well. As originally conceptualized these individuals were thought to activily inform friends and neighbors of what they had learned during their travels outside their social system (13). In so doing

they were assumed to link the remaining population with information about new ideas which they otherwise would not have had. Current evidence indicates that these individuals rarely disseminate such information to others (1 ; Z1). Awareness of inputs and the necessary information to evaluate them is gained instead through seeking (1 ; p. 116). The establishment of diffusion agencies in a given area whose strategy is to promote innovations at the local level could be a possible exception. Even then, their strategy in promoting innovations may not afford all people the same opportunity to adopt.

Thus, while work focusing on innovation adoption from an information flow perspective has dominated the spatial diffusion tradition, research focusing on the "market" aspects of diffusion may be of far greater importance to understanding the spatial diffusion process in light of these more recent findings.

THE STUDY

In order to learn about the importance of "market" factors to the diffusion of agricultural inputs among farmers on the Central Plain of Thailand, potential adopters at each level in the urban hierarchy were interviewed. At the local level these individuals included 184 farmers residing in four villages (Wat Bua 1, Wat Bua 2, Don Khanad and Thung-si-long), on the western edge of the Central Plain (Fig. 1). The villages are in the amphoes (counties) of changwat (province) Nakhon Pathom.. In this part of the Central Plain of Thailand transplanted and broadcast rice are the dominant crops. Four propagator

supported inputs designed for rice were examined. They included: fertilizer, herbicide, insecticide, and fungicide.

Data were gathered from the farmers in each village through intensive personal interviews to determine their use of sources during the dual aspects of adoption. Three stages in the decision-making process were chosen to identify the sources used and the time at which the farmers passed through each stage--awareness, interest and persuasion. The key sociometric questions used to identify the sources contacted included the following:

1) Awareness Stage. Where, from whom, and in what year, did you first hear about fertilizer, herbicide, insecticide, and fungicide?

2) Interest Stage. Where, from whom, and in what year, did you gain knowledge about the usefulness of fertilizer, herbicide, insecticide, and fungicide?

3) Persuasion Stage. Who and/or what, and in what year were you persuaded to adopt or reject fertilizer, herbicide, insecticide, and fungicide?

For those farmers who decided to adopt they were also asked:

4) Acquisition Stage. Where, from whom, and in what year, did you first purchase fertilizer, herbicide, insecticide, and fungicide?

These and other data then made it possible to focus on relationships based on who talked to whom as the unit of analysis. Previous research has focused primarily upon the time order of adoption, neglect-

ing the interactive process of communication flows in a spatial and temporal setting (6).

INFORMATION AND INPUT DIFFUSION

The intensive personal interviews with the 184 farmers residing in the four villages revealed that even though all of them had not adopted the four inputs they were all at least aware of their existence. The main sources of information at each stage in the decision-making process were interpersonal contacts. Seeking from these various individuals and not informing as originally hypothesized was the principle way in which the farmers in the four villages gained information about each input. The only exception to this, besides the few farmers who first gained awareness of one or more of the inputs via the radio, were those who had contact with the agricultural extension agent, who activily promoted the adoption of some of the inputs at the village level.

The interpersonal sources sought out by these farmers included: merchants and government officials in the urban centers beyond the confines of the villages (cosmopolite sources); and fellow farmers who reside nearby (localite sources) (17; pp. 22-23). As with other research findings, interpersonal cosmopolite sources who differed significantly in social status were mentioned as well as interpersonal localite ones. In three of the four villages, no less than 77 percent of the farmers included cosmopolite sources for one or more of the four inputs (Table 1).

When only the time order of adoption of the four inputs in each

urban center in the changwat was compared with when the farmers in each village adopted, it appears that information and inputs diffuse through space in a hierarchical manner even when they are propagator supported. This can be seen in Figure 2 where the time order of adoption in the changwat began in Nakhon Pathom, the provincial capital and largest city, diffused to the next lower urban centers, then to the minor urban centers in most cases in the hierarchy, and finally to the four villages. The diffusion of the inputs to these villages appears to have been delayed until the lowest order urban centers had adopted because each was not nearer to an earlier adopter; that is, one of the higher order urban centers in the changwat. Thus, when only the time order of adoption was considered the data appear to validate the importance of the information flow perspective to explaining the spatial diffusion of innovations.

However, when the time at which the four agricultural inputs diffused through the urban centers in the changwat was compared with when the farmers in each village gained awareness of each, the pattern of information diffusion appears to have excluded the lower order urban centers, but, nevertheless spread to the villages anyway. In each village approximately one-half of the farmers were aware of the inputs before the lower order urban centers possessed awareness of them and had adopted (Fig. 2). These data suggest that not only are the various urban centers in the central place hierarchy viewed differently by the propagators of these innovations, but that the famers are willing to travel considerable distances when in search of information

about new agricultural technology. To ascertain the way in which the various factors influenced the pattern of diffusion of the four inputs and the rate at which they were adopted, the distribution policies of the various propagators and the spatial context in which the decision-making process and acquisition took place were examined.

THE PROPAGATORS AND THEIR DISTRIBUTION POLICIES

Public as well as private propagators transmitted information to prospective adopters in the study area. The primary transmitters of information in the public sector on the four inputs were agents of the Ministry of Agriculture. Ministry decisions, made in Bangkok, determined the type and the degree of information sent to the extension offices in the changwat and amphoe administrative centers in the country. Because of this structure, information on inputs diffused down the Thai urban hierarchy. Information diffused from Bangkok, the primate city, to the changwat capitals, until the extension agents in the amphoe towns were reached. In changwat Nakhon Pathom this included the urban centers of Nakhon Pathom, Nakhon Chaisi, Kamphaengsaen, and more recently Don Tum (Fig. 1). The promotional activities of the Ministry unfortunately did not provide potential adopters throughout the country with the same opportunity to adopt. Selected changwats and amphoes of these changwats which were perceived to be in greater need were targeted to receive the information before others. In changwat Nakhon Pathom, for example, promotional efforts afforded selected amphoes access to information about some of the inputs as much as 14 years before others (Table 2).

Once information had diffused to the changwat and amphoe levels the opportunity for an individual to adopt was further affected by decisions made by the extension agents. The agents in each amphoe administrative centers in the changwat did not have contact with potential adopters in the private sector, such as merchants. The need for identifying potential suppliers of the agricultural inputs in the urban centers near the villages where they were promoting them was not seen as part of their designated responsibility. The same was also true for the merchants and other entreprenuers in the amphoe and changwat centers where the extension agents maintained their offices. Information emanating from the public sector therefore excluded the private sector entreprenuers at each level in the Thai central place hierarchy and flowed directly from the extension offices via the agents to the village level.

The diffusion of information to the various villages under the jurisdiction of the extension agent, like that of the Ministry, also did not afford each the same access to information about the four inputs. Of the four villages included in the study, two, Wat Bua 1 and Wat Bua 2 were never visited by the extension agent for the expressed purpose of making farmers aware of the four agricultural inputs. In Thung-si-long and Don Khanad, on the other hand, such promotional activities took place on several occasions.

Interviews with the extension agents revealed that the timing of promotional efforts was based on whether they perceived the farmers in the various villages as "progressive" or not. "Progressive"

villages such as Thung-si-long and Don Khanad, though not the first to be contacted in their respective amphoes, nevertheless benefited from the downward flow of government information, while villagers in Wat Bua 1 and Wat Bua 2 never received current information on agricultural advances. The extension agent one can conclude acted as a secondary propagator by establishing a set of locational priorities, as the Ministry of Agriculture had, and in so doing provided some villages with the opportunity to adopt while excluding others because of the perceived likelihood of success he could obtain.

Access to information emanating from the extension service was not only limited to those villages that were perceived as "progressive" but to a select group of farmers in each village as well. In Don Khanad and Thung-si-long only a select group of farmers identified the extension agent as a source of information. The major reason for this stems from the strategy used by the agents at the village level. In an attempt to diffuse the inputs as rapidly as possible, they established their credibility among the farmers by associating themselves with and directing their promotional efforts through the puyaiban (village headman). As a result only those farmers who possessed a favorable perception of the puyaiban attended meetings called by the extension agent. Since village level promotional activities were limited to the extension service, access to other informal cosmopolite sources, which were used extensively by most farmers, depended upon their travel behavior outside the village to urban centers frequented by the various propagators.

Private entreprenuers in the urban centers in the study area generally gained access to information about new agricultural technology and were supplied with them through traveling salesmen. These individuals represented either Bangkok-based manufactures of agricultural inputs or companies that imported them. Interviews with the various companies promoting agricultural inputs on the Central Plain of Thailand as well as the entreprenuers in the urban centers in changwat Nakhon Pathom revealed that these private companies have traditionally concentrated their efforts in the larger urban centers. More recently these companies have expanded their promotional efforts in selected amphoe administrative centers. In changwat Nakhon Pathom this has limited to Nakhon Chaisi (Fig. 3). The lower order urban centers, with one exception (Huay Pho) have and continue to be excluded(Fig. 3). The avoidance of these towns and villages stems from the decision on the part of the companies to concentrate their efforts in the more profitable locations first as theorized by Brown and Cox. In other words, the villages and towns were seen as the valleys of the demand curve, contrasted to the cities where demand was seen as more considerable. Information emanating from the private sector, like that from the public sector, thus did not diffuse through all of the lower order urban centers because of their perceived profitability.

Interviews with the merchants in the lower order urban centers revealed that they gained knowledge of the inputs through an upward flow of information from farmers residing nearby who frequented the larger urban centers. These farmers, thus, became the promoters of the four agricultural inputs at this level in the central place

hierarchy. Unfortunately, there was a long delay between when these farmers began sharing information about the four inputs with these merchants and when the inputs were available in their stores. This delay occurred because the merchants generally did not seek further information about a given input or make a decision about adoption until there was sufficient demand for it from local customers. Figure 2 suggests that this delay was due to the fact that all farmers did not have equal access to information about each input. Since well over half of the farmers in each village made use of informal cosmopolite sources, their differential access to places and people where the information was available may have greatly affected the time at which potential adopters at each level in the urban hierarchy were capable of adopting (Fig. 4).

THE SPATIAL BEHAVIOR OF THE THAI FARMER

An examination of the travel behavior of the Thai farmers in each village revealed that they were far less spatially restricted than has been suggested of farmers in developing countries. On the average these farmers traveled considerable distances on a regular basis. The farmers' use of space included one or more urban center(s) on a weekly basis, at least one larger center on a monthly basis, and the changwat capital, Nakhon Pathom, and beyond yearly (Fig. 1). Farmers visited urban centers within a radius of their village of eight kilometers at least once a week, fifteen kilometers at least once a month, and fifty kilometers at least once a year. These data suggest that

even though the distribution policies of the private propagators excluded the lower order urban centers near the villages, the farmers had the same opportunity to adopt since virtually all farmers did travel to Nakhon Pathom. In actual fact, however, many farmers did not make use of these sources. In Thung-si-long and Don Khanad, only one-third and one-half of the farmers respectively, who sought information from informal cosmopolite sources, did so in Nakhon Pathom. In Wat Bua 1 and Wat Bua 2, contact with sources in Nakhon Pathom dropped to less than 10 percent. An examination of the farmers' travel behavior suggests that the reason many farmers did not make use of these sources was due to the frequency with which they traveled to the various urban centers in the changwat.

An analysis of the spatial behavior of the farmers' on a weekly, monthly, and yearly basis revealed that significant differences in the frequencies with which they traveled to the various urban centers in the changwat were common. Those whose communication behavior included sources in the amphoe and changwat centers, had for the most part, access to these centers on either a weekly or monthly basis. Conversely, those farmers who sought only in the nearby urban centers had contact with these same urban centers at frequencies of only once or twice a year. Weekly or monthly contact for these farmers was limited to the lowest order urban centers in the changwat. When the frequency of contact with the urban centers where the farmers acquired the information was examined, it was discovered that the intensity of the communication relationship, as communication researchers have argued,

was crucial to the pattern of information seeking. For the vast majority of the farmers (72.8 percent) weekly or monthly contact with the urban center where the source was located was essential before seeking occurred. There was one exception to this pattern however. A few farmers had the credibility of the cosmopolite source indirectly established by fellow farmers. When this occurred previous contact with the informal source was normally not essential because of the fellow farmer's knowledge of the individual.

The ability of the farmer to overcome the friction of distance to include urban centers where the inputs were being promoted at frequencies necessary to establish effective communication relationships thus affected not only the pattern of diffusion, but had a direct bearing on the time at which the decision-making aspect of adoption began. Farmers whose information seeking was limited to the local area, for example, did not have access to information available in Nakhon Pathom until many years later and only then because of the upward flow of information from fellow farmers.

Even though the distribution policies of the various propagators and the travel behavior of the farmers did not interface in a way to afford each farmer with the same opportunity to complete the decision-making aspect of adoption, the same was not true when it came to their acquisition. An analysis of the farmers' communication behavior revealed that fellow farmers who frequently functioned at the persuasion stage readily informed those seeking advice where the input could be purchased. Thus, once a farmer was persuaded of an inputs relative

advantage knowledge of where to purchase it was not a barrier. For some farmers this included merchants in urban centers visited by the source, but which they themselves had not. For those farmers who did not gain awareness of the inputs until much later, acquisition was even less of a problem. Since merchants in the lower order urban centers responded to the demand for the various inputs generated by farmers who had adopted earlier, virtually every farmer had ready access to the inputs after 1966.

CONCLUSION

This study has examined the spatial diffusion of agricultural innovations on the Central Plain of Thailand. The perspective developed focused on two "market" factors of diffusion, which were posited as controlling the availability of innovations to potential adopters, to ascertain what role they played in shaping diffusion patterns. The factors included the distribution policies of the propagators and the travel behavior of the potential adopters. Previous work has given little attention to these factors since it is implicitly assumed that all potential adopters have an equal opportunity to adopt.

An analysis of the spatial diffusion of the four agricultural inputs revealed that the two "market" factors not only played a major role in shaping their diffusion on the Central Plain of Thailand, but the patterns that evolved differed from previous research based on the information flow perspective. Information emanating from the public sector propagators flowed through the administrative

hierarchy, which coincided with the larger urban centers in the hierarchy, but all locations and thus all prospective adopters did not have the same opportunity to adopt. Decisions made by the Ministry of Agriculture enabled selected changwats (provinces) and amphoes (counties) of these changwats, which they perceived to be in greater need, to receive the information first.

At the local level, extension agents acting as secondary propagators further affected the pattern of diffusion. Promotional activities excluded private entreprenuers in the urban centers and were limited to those villages where the agent perceived there to be the greatest potential for success. In these "progressive" villages the farmers' access to information about new agricultural technology was also influenced by the promotional strategy used by the agents. Because the agents chose to direct their promotional efforts through the puyaiban (village headman), only those farmers who perceived this farmer favorably attended meetings called by the agents.

Information emanating from the private sector via propagators representing the various chemical companies also altered the traditionally accepted pattern of innovation diffusion. For all practical purposes these companies concentrated their efforts in the larger urban centers which were seen as more profitable. Lower order centers have only more recently been exploited, but promotional activities have and continue to exclude the lowest order centers.

An examination of the travel behavior of each farmer revealed that it too had had an impact upon the spatial diffusion of the four agricultural inputs. The distance decay properties of the neighborhood effect did not limit many potential adopters access to places and

people nearby. Many farmers willingly traveled as much as 50 kilometers frequently enough to establish effective communication relationships and acquire information. As a result, information and inputs diffused to the village level before they were available in the lowest order urban centers. An upward flow of information from farmers acting as secondary propagators shared information about new inputs with the merchants in these small towns.

Access to information through informing, however, was rare. Information about inputs was gained primarily through seeking from fellow farmers and sources in the various urban centers in the changwat. The opportunity to adopt depended therefore upon the time at which information was available within that portion of the space where effective communication was possible. Thus, not only was the spatial diffusion of the inputs affected by the two "market" factors but the rate at which adoption could occur as well.

Even though the "market" factors greatly affected the time at which farmers were able to complete the decision-making aspect of adoption, they had little impact upon the acquisition of the inputs. Fellow farmers who generally served as sources at the persuasion stage freely advised their friends and neighbors where inputs could be purchased. The acquisition phase was also facilitated by the upward flow of information to the lower order centers by farmers whose travel behavior had included the more distant centers. Thus, by the time farmers had completed the decision-making phase inputs were readily available to all.

Thus, when the processes that lead to the adoption of innovations are examined from a perspective that includes who talks to whom during the decision-making and acquisition phases of adoption, instead of only focusing on the time order of adoption, the spatial and temporal pattern of diffusion does not follow that suggested by the information flow perspective.

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TABLE 1.--INFORMAL COMMUNICATION BEHAVIOR

Village	Village Level Contacts		Beyond Village Contacts
	Localite Sources (Other Farmers)	Cosmopolite Sources (Extension Agents)	Cosmopolite Sources (Public & Private (Entreprenuers)
Wat Bua 1	---	a	100% (12)
Wat Bua 2	19% (6)	a	81% (25)
Don Khanad	23% (11)	10% (5)	77% (32)
Thung-si-long	14% (13)	17% (18)	59% (55)

[a] No informal cosmopolite sources promoted inputs in the village.

Table 2.--PUBLIC SECTOR PROMOTIONAL ACTIVITIES

Amphoe - Village	Fertilizer	Herbicide	Insecticide	Fungicide
Nakhon Chaisi	1966	--	1966	1966
Wat Bua 1				
Wat Bua 2				
Muang Nakhon Pathom	1957	1957	1957	1957
Don Khanad				
Kamphaengsaen	1964	1961	1961	1971
Don Tum[a]	1972	1969	1969	1969
Thung-si-long				

Source: Ministry of Agriculture, Bangkok, 1975.

[a] The extension office was not established until 1969.

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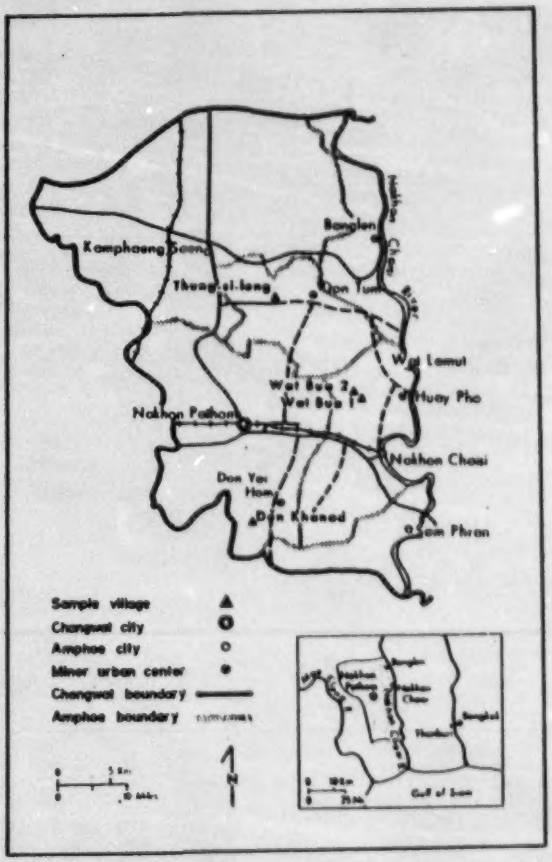
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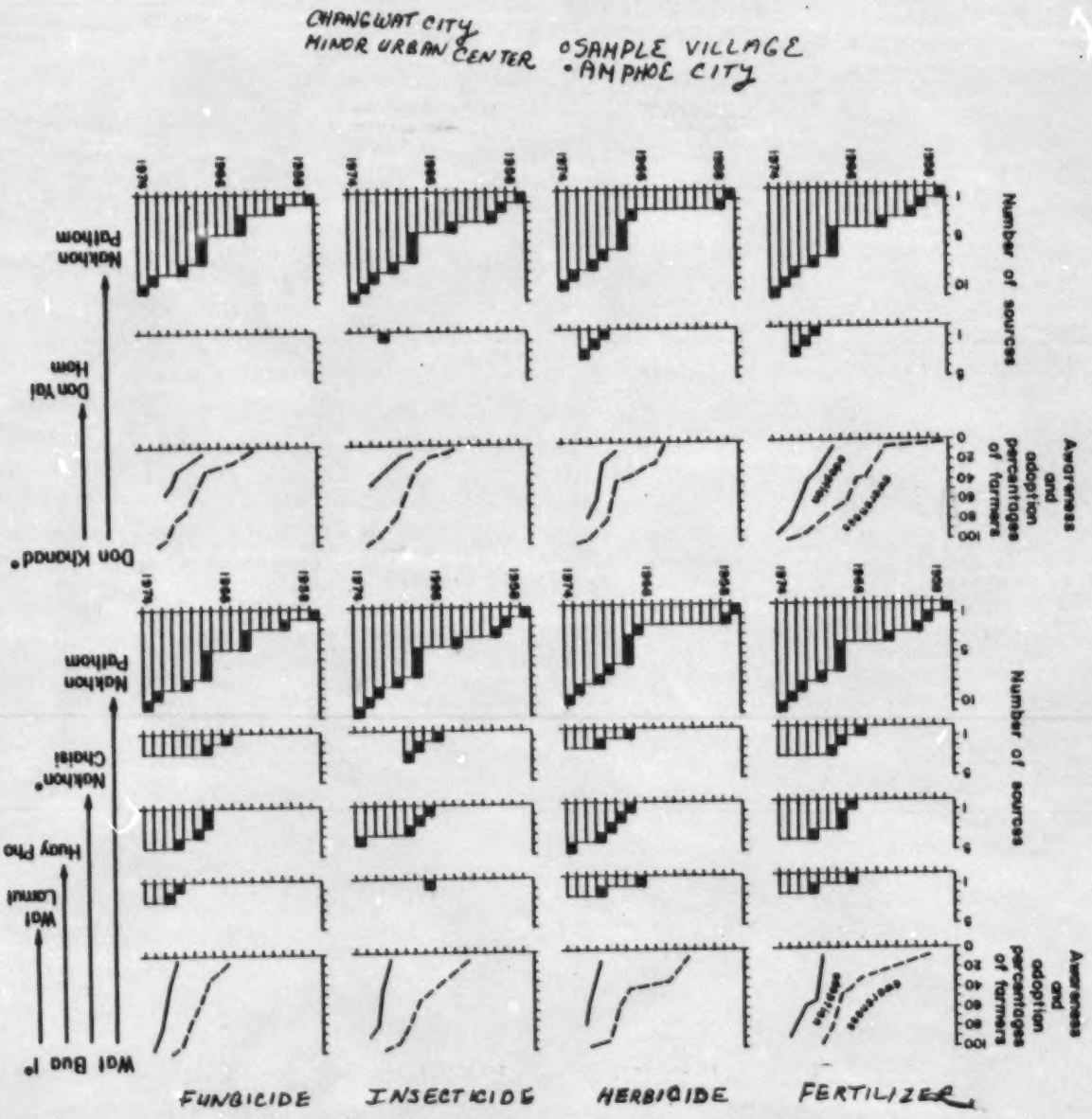
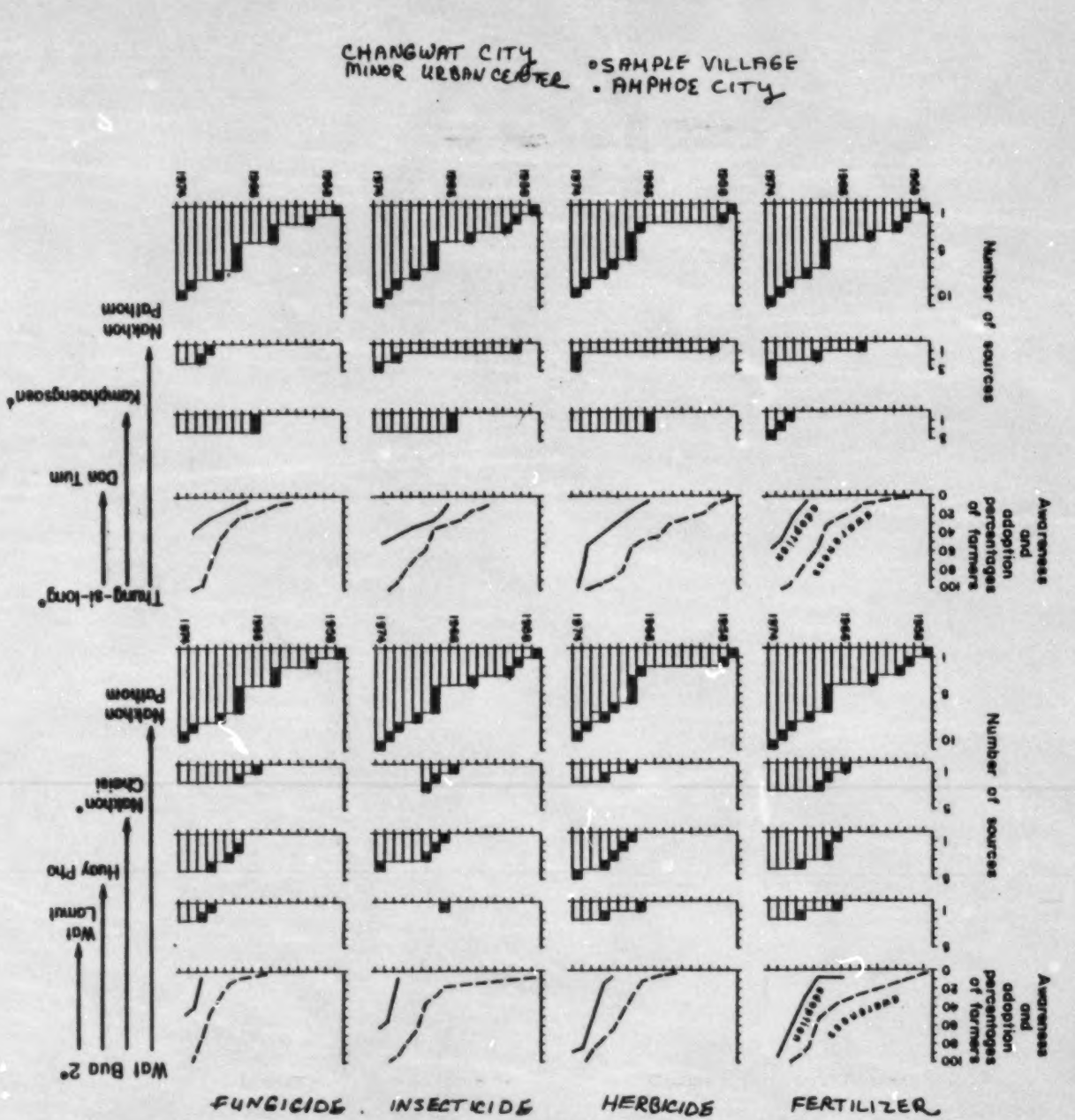
Bangkok
Nakhon Chai Si
Thung Si Iang
Wat Lamut
Wat Bua 2
Wat Bua 1
Huay Pho
Nakhon Pathom
Nakhon Chaisi
Don Yai Hom
Don Khanod
Sam Phran
Sample village
Changwat city
Amphoe city
Minor urban center
Changwat boundary
Amphoe boundary
N
Gulf of Siam


CHANGWAT CITY
MINOR URBAN CENTER
°SAMPLE VILLAGE
•AMPHOE CITY
Wat Bua I°
Wat Lamul
Huay Pho
Nakhon° Chaisi
Nakhon Pathom
Don Khanod°
Don Tai Hom
Nakhon Pathom
Number of sources
Awareness and adoption percentages of farmers
FUNGICIDE
INSECTICIDE
HERBICIDE
FERTILIZER


CHANGWAT CITY
MINOR URBAN CENTER
•SAMPLE VILLAGE
• AMPHOE CITY
Wai Bua 2°
Wai Lamui
Huay Pho
Malithon° Chaisi
Nakhon Pathom
Thung-si-kong°
Don Tum
Kamphaengsaen°
Nakhon Pathom
Number of sources
Awareness and adoption percentages of farmers
FUNGICIDE
INSECTICIDE
HERBICIDE
FERTILIZER

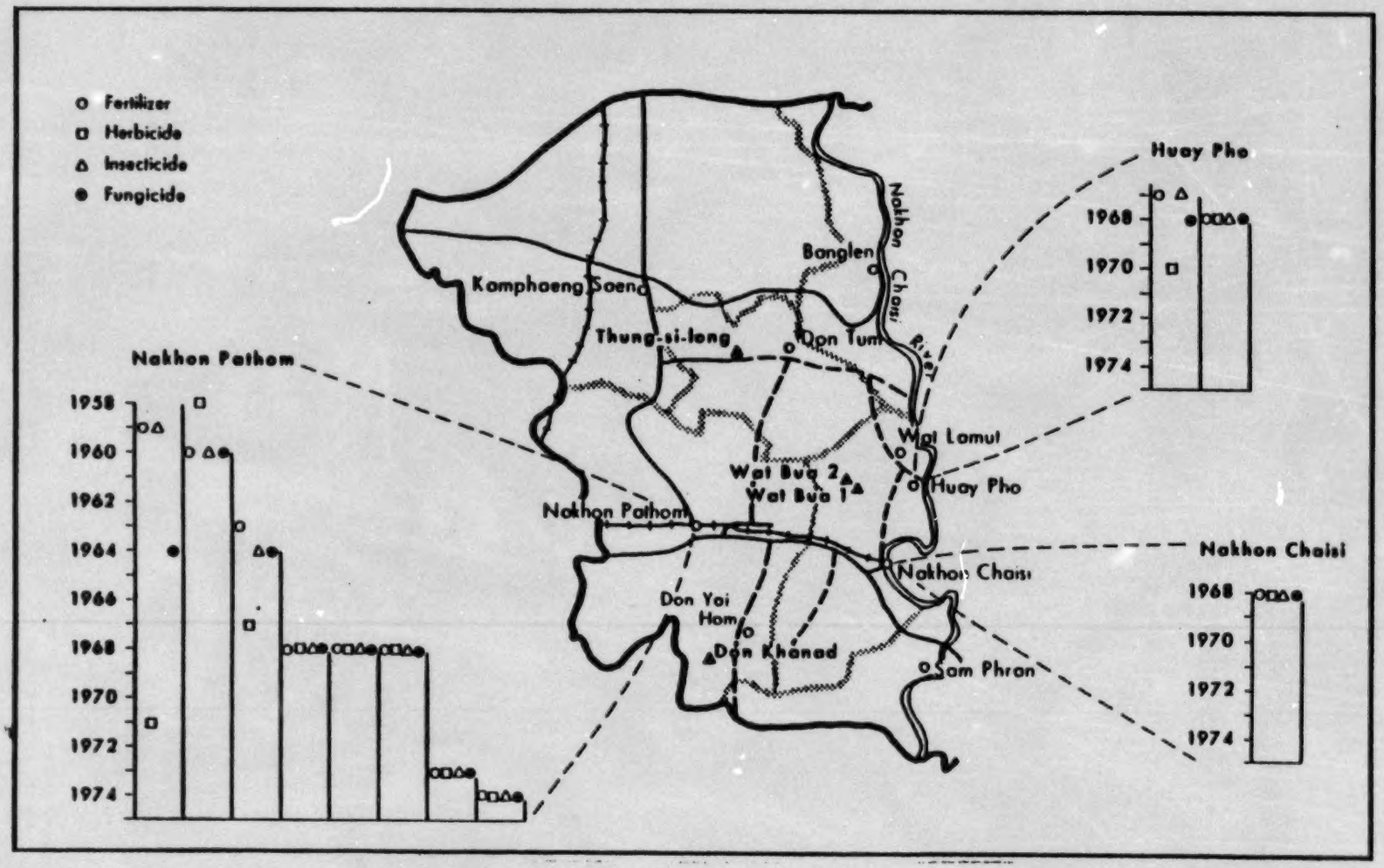


Fig. 3. Information and Input Availability Via Private Propagators;

Dates Private Entreprenuers First Stocked each of the Four Inputs for Rice.

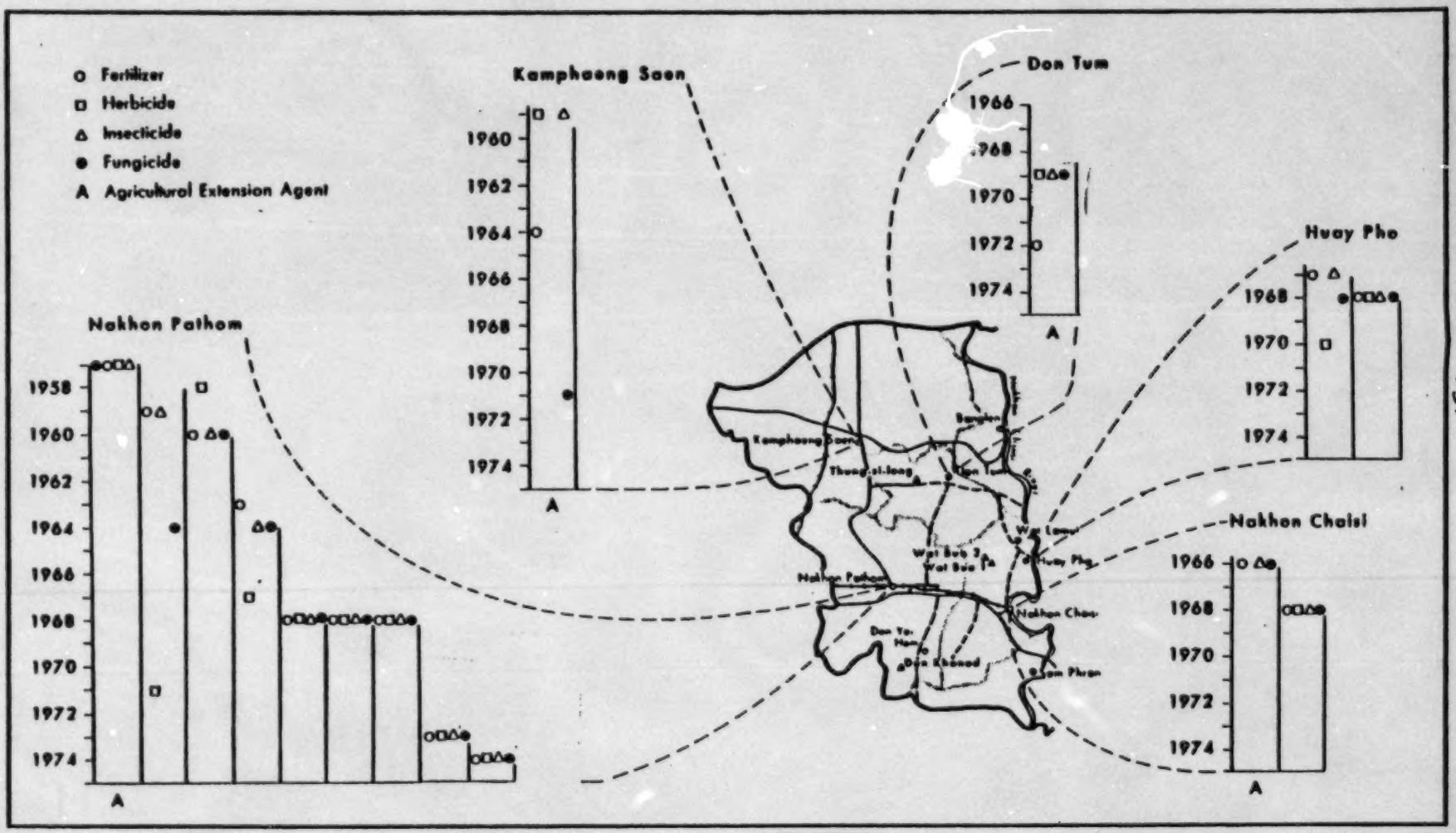


Fig. 4. Summary of Information and Input Availability Via Public and Private Propagators.